UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/844,677	04/30/2001	Ralf Zuber	33766W028	8982

7590 07/07/2003

David A Kalow Esq
Kalow & Springut LLP
488 Madison Avenue
19th Fl
New York, NY 10022

EXAMINER	
WILLS, MONIQUE M	
ART UNIT	PAPER NUMBER
1746	9

DATE MAILED: 07/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/844,677	ZUBER ET AL.	
	Examin r	Art Unit	
	Wills M Monique	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 April 2001* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement(s) filed October 9, 2001 and October 12, 2001 have been received and complies with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609.

Priority

European foreign priority document(s) 00 109 276.6, filed April 28, 2000 and submitted under 35 U.S.C. 119(a)-(d), has/have been received and placed of record in the file.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-10 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Kato U.S. Patent 6,127,059.

Kato teaches a gas diffusion layer for solid polymer electrolyte fuel cells. The gas diffusion layer includes a carbon fiber woven cloth having a surface and a coating of a fluororesin (such as polytetrafluoroethylene) containing carbon black on the

surface, wherein the carbon fiber woven cloth is adapted to be disposed in the solid polymer electrolyte fuel cell such that the coating is adjacent to the catalyst layer in the solid polymer electrolyte fuel cell. Preferably, the coating penetrates no more than one-half the thickness of the carbon fiber woven cloth. Most preferably, the coating penetrates no more than one-third the thickness of the carbon fiber woven cloth. The carbon fiber woven cloth may be pre-treated with a water-repellent fluororesin (such as polytetrafluoroethylene), or with a mixture of a fluororesin and carbon black, to enhance water repellency. See the abstract. The carbon fiber woven cloth is a product of weaving carbon fiber yarns and the thickness of the cloth should be from 0.1 to 1 mm (100μm to 1000μm). See column 3, lines 50-55. The layer (contact layer) composed of a fluororesin and carbon black that is formed on the surface of the carbon fiber woven cloth prevents the flooding of the catalyst layer by the product water or humidification water during the operation of the fuel cell (col. 3, lines 55-61). This layer (contact layer) should not penetrate more than one-half, and preferably no more than one-third, of the thickness of the carbon fiber woven cloth. If it penetrates any further, it will block the voids that serve as the gas channel in the surface direction of the carbon fiber woven cloth, and there will be a corresponding drop in gas diffusion performance. It is preferable for this layer (contact layer) to be 5 to 100 mm, and preferably 10 to 40 mm thick. See column 4, lines 1-15. Prior to coating the carbon cloth with said polymer/carbon layer (contact layer), the carbon fiber woven cloth may undergo a water repellency treatment so that the above-mentioned paste will not permeate into the woven cloth may be directly coated and dried, after which this

product is heat treated, which forms the desired layer on the surface thereof. The water repellency treatment here can be accomplished using a fluororesin or another such water-repellent resin, or a common water repellant, or a mixture of this with carbon black ,or the like, but the amount applied much be kept low enough that the voids between the carbon fibers will not be blocked. See column 4, lines 25-30. The mixing proportions (weight ratio) of the fluororesin and carbon black that make up the layer composed of a fluororesin and carbon black is set between 10:90 and 60:40, and preferably between 20:80 and 50:50 (col. 4, lines 50-55). The term fluororesin is a resin that is water-repellent and contains fluorine in its structure, such as PTFE (polytetrafluoroethylene) (Example 1). The gas diffusion structure was made as follows: a carbon fiber woven cloth is used having a thickness of approximately 40 microns. A dispersion for the water repellency treatment of this cloth is prepared by *thoroughly mixing* 50 g of carbon black and 25 g PTFE dispersion with 1 L of water to and about 5wt % nonionic surfactant. The carbon fiber woven cloth is impregnated by or coated immersing the cloth in this dispersion, where said cloth is inherently coated both sides. The cloth is then air dried, after which it was heated (calcined) for 30 minutes at 370° C. to sinter the PTFE, which fixes the carbon black and carbon fibers and, simultaneously, decomposed and removed the surfactant. Next, 15 g of the same carbon black and 7 g PTFE dispersion is added to 100 g and a nonionic surfactant, and these components were thoroughly dispersed to obtain a dispersion (contact layer). This dispersion (contact layer) was dripped onto the water-repellent carbon fiber woven cloth, then a thin coat was brushed onto the surface of the water-repellent carbon fiber

woven cloth. Hot air at 150° C. was directed at this product to remove the water, and this product was heat treated (calcined) for 40 minutes at 370° C, which formed a water-repellent conductive porous layer composed of PTFE and carbon black on the surface of the carbon fiber woven cloth. Lastly, the gas diffusion electrode can be fabricated by hot pressing (col. 1, lines 15-40). The polymer electrolyte fuel cell is fabricated by positioning the gas diffusion layer/collector 14 on both sides of a membrane/electrode junction 11 in which the catalyst layers 11a and 11b are integrated, this assembly is sandwiched between separators 12. See col. 6, lines 30-40.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato U.S. Patent 6,127,059 as applied to claim 1 above, and further in view of Cabasso et al. U.S. Patent 5,783,325.

Kato teaches a gas diffusion electrode for solid polymer fuel cells as described hereinabove. More specifically, the reference teaches impregnating the carbon cloth by dipping said cloth in a dispersion.

The reference is silent to preparing contact layer films, then applying said films to the surface of the carbon support.

However, Cabasso teaches fabricating the contact layer by casting a carbon/polymer mixture onto a glass substrate to make a contact layer film. Then, said layer is applied to the carbon support (col. 9, lines 10-20). This method is employed because the formation of good gas diffusion electrodes requires spreading the reactant gases homogeneously within the matrix of the gas diffusion electrode. One problem in fuel cell devices, and especially electrodes, is homogeneity of the pathways. If the electrode matrix is denser in one area and less dense in another area, then most of the gas stream will be directed to the less denser area. As a result, the catalyst will not be fully utilized. Therefore, in order to ensure homogenaety of the electrode surface, the contact layer is made into a film prior to coating the carbon support, to ensure that the catalyst will be fully utilized. See column 8, lines 54-68 and column 9, lines 1-7.

Kato and Cabasso are analogous art because they are from the same field of endeavor namely, the fabrication of gas diffusion electrodes for polymer electrolyte fuel cells.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ casting a contact layer film prior to contacting it with the carbon support of Kato, to ensure homogeneity of the electrode surface so that the catalyst will be fully utilized, thereby improving power generating efficiency, as taught by Cabasso.

Conclusions

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Koschany et al. U.S. Patent 6,451,470 teaches a gas diffusion electrode with reduced difussing capacity for water (abstract). Koschany et al. U.S Patent 5,998,057 teaches a cas diffusion electrode for polymer electrolyte membrane fuel cells.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Monique Wills whose telephone number is (703) 305-0073. The Examiner can normally be reached on Monday-Friday from 8:30am to 5:00 pm.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

If attempts to reach Examiner by telephone are unsuccessful, the Examiner's supervisor, Randy Gulakowski, may be reached at 703-308-4333.

The unofficial fax number is (703) 305-3599. The Official fax number for non-final amendments is 703-872-9310. The Official fax number for after final amendments is 703-872-9311.

Mw

06/26/03

RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700